

Documentation for Natural Events Excluded Data
Pahala, Hawaii Air Monitoring Station, AIRS ID 15-001-2016
Ocean View, Hawaii Air Monitoring Station, AIRS ID 15-001-2020
THIRD QUARTER 2010 Exceedances of the 24-hour, 3-hour and 1-hour SO₂
NAAQS

I. Exceedances and Natural Event Flag

Station Name:	Pahala (PA16)		
AIRS ID:	150012016		
Address:	Ka'u High/Pahala Elementary School 96-3150 Pikake Street Pahala, Hawaii 96777		
Station start date:	August 10, 2007		
Exceedances of the 24-hour SO ₂ NAAQS (0.14 ppm), 3-hour SO ₂ NAAQS (0.5 ppm) and 1-hour SO ₂ NAAQS (0.075 ppm)			
Date	24-hour SO ₂ Block Average (ppm)	3-hour SO ₂ Block Average (ppm)	1-hour SO ₂ Average (ppm)
07/23/10	0.16	0.6	-
07/25/10	0.17	-	-
08/23/10	-	-	0.300
08/24/10	-	-	0.117
08/25/10	-	-	0.177
08/26/10	-	-	0.343
08/27/10	-	-	0.246
08/29/10	-	-	0.132
08/30/10	-	-	0.345
08/31/10	-	-	.0146
09/01/10	-	-	0.202
09/02/10	-	-	0.199
09/03/10	-	-	0.380
09/04/10	-	-	0.225
09/05/10	-	-	0.132
09/06/10	-	-	0.101
09/07/10	-	-	0.205
09/08/10	-	-	0.126
09/09/10	-	-	0.361
09/11/10	-	-	0.436
09/12/10	-	-	0.099
09/13/10	-	-	0.196
09/15/10	-	-	0.353
09/16/10	-	-	0.296
09/17/10	-	-	0.217
09/18/10	-	-	0.472
09/19/10	-	-	0.101
09/20/10	-	-	0.189

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09/21/10	0.2	-	0.582
09/22/10	-	-	0.081
09/23/10	-	-	0.158
09/24/10	-	-	0.176
09/25/10	-	-	0.159
09/26/10	-	-	0.110
09/27/10	-	-	0.284
09/28/10	-	-	0.317
09/29/10	-	-	0.184

Station Name:		Ocean View (OV18)	
AIRS ID:		150012020	
Address:		Ocean Parkway Hawaii Ocean View Estates, Hawaii 96737	
Station start date:		April 1, 2010	
Exceedances of the 1-hour SO ₂ NAAQS (0.075 ppm)			
Date	24-hour SO ₂ Block Average (ppm)	3-hour SO ₂ Block Average (ppm)	1-hour SO ₂ Average (ppm)
08/24/10	-	-	0.154
08/25/10	-	-	0.095
08/26/10	-	-	0.125
08/27/10	-	-	0.150
09/02/10	-	-	0.112
09/03/10	-	-	0.228
09/11/10	-	-	0.088
09/13/10	-	-	0.124
09/21/10	-	-	0.254
09/22/10	-	-	0.087
09/26/10	-	-	0.197
09/27/10	-	-	0.309
09/28/10	-	-	0.087
09/29/10	-	-	0.194

All of the exceedances are flagged using the Natural Event Qualifier "RS" for Volcanic Eruptions. Beginning August 23, 2010, any exceedance of the newly promulgated 1-hour SO₂ NAAQS (revised June 22, 2010) was to be reported.

II. Description of Natural Events

- A. The Kilauea volcano on the island of Hawaii has continued to emit SO₂ from two vents located at the Halema'uma'u and Pu'u O'o craters (*see Attachment 1-Hawaiian Volcano Observatory Daily Update*). Prior to December 2007, approximately 200 tons of SO₂ came from the Halema'uma'u vent and 1,800 tons came from the Pu'u O'o vent. In late December 2007, the SO₂ emission rate began to increase; and on March 13, 2008, a new gas vent at Halema'uma'u increased the amount of SO₂ from this location, from 200 to 2,000 tons per day.

Since March 2010, the combined SO₂ emissions from both vents has somewhat decreased and averaged near or below the levels prior to the March 2008 eruption at Halema'uma'u; however, the emissions at Halema'uma'u has continued to average well above the pre-eruption emission rate. From July to September 2010, the amount of SO₂ emitted per day from Halema'uma'u ranged from approximately 254 tons per day to 1,323 tons per day (*see Attachment 2*).

The geographical location of the Halema'uma'u vent, being further inland, appears to have a greater effect on the air quality in downwind communities than the Pu'u O'o vent. This can be seen in a vog model output created by the University of Hawaii's Department of Meteorology, available at the website <http://weather.hawaii.edu/vmap/hysplit/> (*see Attachment 3*). As explained in previous exceptional events documents, prevailing winds from the northeast usually carry the SO₂ gas to nearby downwind communities such as Pahala. As the SO₂ gas travels around the southern end of the island, it interacts with other atmospheric constituents to form particulates that affect communities farther away from the vents, such as Kona. The Ocean View community, located between Pahala and Kona, is impacted by both the SO₂ gas and particulates. When the winds shift to a southerly direction, the volcanic emissions are carried to towns northeast of the volcano, such as Mountain View and Hilo.

- B. Department of Health (DOH) Monitoring of Volcanic Emissions -
The volcano is the single largest emission source in the state. The greatest impact is in communities from Hilo on the eastern side of the island, to Kona on the west.

Table 1 describes the locations, AQS ID, pollutants monitored, and start dates of the DOH stations established to monitor volcanic emissions.

Table 1: DOH Air Monitoring Stations for Volcanic Emissions

Station Name and Address	AQS ID	Pollutants Monitored	Start Date
Hilo 1099 Waianuenue Avenue Hilo, HI	150011006	SO ₂ PM _{2.5}	March 1995 May 1, 2008
Kona Konawaena High School 81-1043 Konawaena School Road Kealahou, HI	150011012	SO ₂ PM _{2.5}	April 1997 March 13, 2008
Puna E 13-763 Leilani Avenue, Pahoa, HI	150012010	SO ₂	February 2005
Pahala Ka'u High/Pahala Elem. School 96-3150 Pikake Street Pahala, HI	150012016	SO ₂ PM _{2.5}	Aug. 10, 2007 April 11, 2008
Mountain View 17-860 Volcano Road Mt. View, HI	150012017	SO ₂ PM _{2.5}	Dec. 4, 2007 April 11, 2008
Ocean View Ocean View Parkway Hawaii Ocean View Estates, HI	150012020	SO ₂ PM _{2.5}	April 1, 2010 April 1, 2010

III. Causal Relationship of Event to Exceedances

The Pahala and Mountain View stations both began operating in late 2007, with the PM_{2.5} continuous monitors beginning operations after the new Halema'uma'u vent opened in March 2008. The Ocean View station began operating on April 1, 2010, with both the PM_{2.5} and the SO₂ monitors. Historical background data prior to the current eruptive phase, which began in 1983, is not available. The data from the SO₂ monitors at the Pahala and Ocean View stations for the 3rd quarter are shown in chart form in *Attachment 4*.

The exceedances of the 24-hour SO₂ NAAQS that occurred at the Pahala station were during days where the predominant wind direction at the volcano was from the northeast. As described earlier, the northeast winds will carry the plume towards Pahala before wrapping around to the leeward side of the island. As indicated by the Hawaiian Volcano Observatory Daily Updates for those days (*see Attachment 5*), elevated levels of SO₂ was being emitted at Halema'uma'u with the plume moving to the southwest. Supporting weather data is provided from a weather station in the volcano area located just northwest of Halema'uma'u (*see Attachment 6*).

With the predominant northeast trade winds blowing for most of the 3rd quarter, the exceedances of the 1-hour SO₂ NAAQS have all occurred in the downwind communities of Pahala and Ocean View located to the southwest of the volcano. Since August 23, 2010, the effective date of the 1-hour SO₂ NAAQS, the Pahala station exceeded the 1-hour SO₂ NAAQS 35 out of 39 days, and the Ocean View station exceeded 14 out of 39 days.

IV. Public Notification

Public notifications of these exceedances were provided for immediate media release as the exceedances occurred. The public notice on the Clean Air Branch web site was updated as the exceedances occurred (*see Attachment 7*).

V. Public Education

Due to the potential public health emergency of extremely high SO₂ levels affecting communities near the volcano, the Big Island Emergency Operations Center (EOC) was activated and is currently still monitoring the ongoing event. The EOC consists of representatives from the Hawaii County, Civil Defense, DOH, and the Fire Department.

To provide the public with more information regarding vog and the current air quality on the Big Island, the state of Hawaii continues to maintain an automated Vog Helpline, available twenty-four hours a day, seven days a week. In addition, the State of Hawaii Clean Air Branch also maintains a SO₂ advisory webpage - [Hawaii Short Term SO₂ Alert Index](#), which is available to the public. A link to this advisory is provided in EPA's AIRNow's Hawaii State Page.

VI. Public Notice

Included in *Attachment 8* are the affidavits of publication in three newspapers notifying the public of the availability for inspection of this document:

State of Hawaii
Department of Health
Clean Air Branch

- 1) Honolulu Star-Advertiser Public Notice: Affidavit of Publication
(State-wide distribution)
- 2) Hawaii Tribune-Herald Public Notice: Affidavit of Publication
(East Hawaii newspaper distribution)
- 3) West Hawaii Today Public Notice: Affidavit of Publication
(West Hawaii newspaper distribution)

Attachments

- Attachment 1: Hawaiian Volcano Observatory Daily Update of SO₂ Emissions – September 30, 2010
- Attachment 2: SO₂ Emissions from Halema'uma'u
- Attachment 3: Vog Measurement and Prediction (VMAP) Vog Model
- Attachment 4: Pahala and Ocean View Stations SO₂ Monitor Data Charts
- Attachment 5: Hawaiian Volcano Observatory Daily Update of SO₂ Emissions – July 23 and 25, 2010 and September 21, 2010
- Attachment 6: Weather station history from Weather Underground – July 23 and 25, 2010 and September 21, 2010
- Attachment 7: Public Notice – Pollutant Levels Elevated on Hawaii Island
- Attachment 8: Affidavit of Publication



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(Back to form)

HAWAIIAN VOLCANO OBSERVATORY DAILY UPDATE

Thursday, September 30, 2010 7:54 AM HST (Thursday, September 30, 2010 17:54 UTC)

This report on the status of Kilauea volcanic activity, in addition to maps, photos, and Webcam images (available using the menu bar above), was prepared by the USGS Hawaiian Volcano Observatory (HVO). Hawai'i Volcanoes National Park status can be found at <http://www.nps.gov/havo/> or 985-6000. Hawai'i County Viewing Area status can be found at 961-8093. All times are Hawai'i Standard Time.

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**Current Aviation Color Code: **ORANGE**

Activity Summary for past 24 hours: Kilauea eruptive activity continued at two locations. In the east rift zone, lava flowed from the TEB vent through tubes to feed one ocean entry. Lava flows were also active within Pu'u 'O'o crater. At the summit, a lava lake within the eruptive vent inset within the east wall of Halema'uma'u Crater produced red glow visible from the Jaggar Museum overnight. Sulfur dioxide emission rates from the summit and east rift zone vents remained elevated.

Past 24 hours at Kilauea summit: Since the end of DI inflation yesterday, the tiltmeter network has recorded continued slow inflation. The surface of the crusted and circulating lava lake at the bottom of the deep collapse pit inset in the southeast edge of Halema'uma'u Crater likewise rose slowly. This slow rise was overprinted by a prolonged high lava stand that lasted from 1:40 pm yesterday afternoon until 3:50 am this morning. During the high lava stand, the lava surface rose about 35 m (115 ft), putting it to within about 110 m (360 ft) of the floor of Halema'uma'u. The lava lit up the gas plume and, when weather permitted, the glow was visible from the Jaggar Museum Overlook overnight; the intensity of the glow was decreased during the high lava stand due to crusting of the lava surface.

Two earthquakes were strong enough to be located beneath Kilauea volcano - one on the the south flank faults, and one near the lower southwest rift. Seismic tremor levels remained elevated and variable but dropped to low values during the lava high stand, followed by a strong tremor burst as lava drained back to its previous level.

The summit gas plume is rising nearly straight up this morning and spreading out over the summit. The most recent (preliminary) sulfur dioxide emission rate measurement was 230 tonnes/day on September 28, only slightly elevated above the 2003-2007 (pre-summit eruption) average of 140 tonnes/day. This measurement was made during a high lava stand, however, when sulfur dioxide emissions are typically lower. Small amounts of ash-sized tephra continued to be wafted up with the gas plume and deposited on nearby surfaces.

Past 24 hours at the middle east rift zone vents: The tiltmeter on the north flank of Pu'u 'O'o recorded continued slow inflation since yesterday morning. At about 3:45 pm yesterday afternoon, lava began to erupt from a vent on the northwest edge of Pu'u 'O'o crater, and lava flows continued to cross the crater floor overnight. Weak glow was visible overnight above a skylight on the lava tube just downslope from the TEB vent. Stronger glow - possibly a small breakout - was visible above the rootless shields on the lava tube farther downslope. Seismic tremor levels were low.

The most recent (preliminary) sulfur dioxide emission rate measurement from east rift zone vents was 300 tonnes/day on September 22, 2010, much lower than the 2003-2007 (pre-summit eruption) average of 1,700 tonnes/day but typical of the low rates since early March, 2010.

Lava from the TEB vent flowed through tubes that carried lava down-slope where it entered the ocean through the Puhi-o-Kalaikini delta. A breakout which began on September 26 near the end of Highway 130, just west of Kalapana Gardens subdivision, was inactive when checked yesterday morning.

HAZARD ALERT: The lava deltas and adjacent areas both inland and out to sea are some of the most hazardous areas on the flow field. Frequent delta/bench collapses give little warning, can produce hot rock falls inland and in the adjacent coastal waters, and can produce large local waves. The steam plume produced by lava entering the ocean contains fine lava fragments and an assortment of acid droplets that can be harmful to your health. The rapidly changing conditions near the ocean entry have been responsible for many injuries and a few deaths.

Kalapana Public Access Information from Hawai'i County Civil Defense: Kalapana Gardens is a private subdivision and access will only be granted to subdivision residents. Private property borders highway 130 through Kalapana, and visitors to the Hawai'i County Lava Viewing Area are not allowed access off the highway easement. Hawai'i County Police will be monitoring the area. Hawai'i County Lava Viewing Area status can be found at 961-8093.

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ATTACHMENT 1

Maps, photos, Webcam views, and other information about Kilauea Volcano are available at <http://volcanoes.usgs.gov/hvo/activity/kilaueastatus.php>. A daily update summary is available by phone at (808) 967-8862.

A map with details of earthquakes located within the past two weeks can be found at <http://tux.wr.usgs.gov/>

A definition of alert levels can be found at <http://volcanoes.usgs.gov/activity/alertsystem/index.php>

Definitions of Terms Used:

high lava stands: Starting in June, 2010, lava within the Halema'uma'u Overlook vent rises 20-40 m over an interval of 10s of minutes, remains high for up to several hours, and then drains back to its previous level, while vigorously degassing, in several minutes. During the high stand, the gas plume becomes wispy, gas emissions halve in rate, and seismic tremor drops to very low levels; the high stand is followed by a strong seismic tremor burst, lasting several minutes, accompanying the draining. Many, but not all, high lava stands start with a rockfall event, some accompanied by VLP seismic energy.

Inflating surface flow: is a lava flow that may not advance but continues to thicken as its top and bottom crusts grow around a continuously replenished molten interior. This can be visualized as a large flat bladder of molten lava that could burst along its edges at any time.

Hakuma horst: a horst is an section of earth that is raised between two nearly parallel faults so that its surface is higher than the surrounding ground. The Hakuma horst is located along the coast west of Kalapana; it was responsible for diverting lava through Kalapana village in 1990 and appears to be having a similar influence on lava flows in 2010.

Halema'uma'u Overlook vent: has been difficult to describe concisely. The vent is actually a pit, or crater, in the floor of the larger Halema'uma'u Crater in the floor of the larger Kilauea caldera or crater - a crater within a crater within a crater. It is easiest to describe as a pit inset within the floor of a crater within a caldera. The pit is about 140 m (460 ft) in diameter at the Halema'uma'u Crater floor, is about 50 m in diameter at the pit floor, and is about 200 m (660 ft) deep. As of November, 2009, a lava pond surface has been visible in a hole in the floor of this pit.

glow: light from an unseen source; indirect light.

incandescence: the production of visible light from a hot surface. The term also refers to the light emitted from a hot surface. The color of the light is related to surface temperature. Some surfaces can display dull red incandescence at temperatures as low as 430 degrees Centigrade (806 degrees Fahrenheit). By contrast, molten lava displays bright orange to orange-yellow light from surfaces that are hotter than 900 degrees C (1,650 degrees F).

CD: Hawai'i County Civil Defense

tonne: metric unit equal to 1,000 kilograms, 2,204.6 lbs, or 1.1 English tons.

tephra: all material deposited by fallout from an eruption-related plume, regardless of size.

ash: tephra less than 2 mm (5/64 inches) in size.

TEB: Thanksgiving Eve Breakout, the designation used for lava flows that started with a breakout on November 21, 2007.

microradian: a measure of angle equivalent to 0.000057 degrees.

DI tilt event: DI is an abbreviation for 'deflation-inflation' and describes a volcanic event of uncertain significance. DI events are recorded by tiltmeters at Kilauea summit as an abrupt deflation of up to a few microradians in magnitude lasting several hours to 2-3 days followed by an abrupt inflation of approximately equal magnitude. The tilt events are usually accompanied by an increase in summit tremor during the deflation phase. A careful analysis of these events suggests that they may be related to changes in magma supply to a storage reservoir at less than 1 km depth, just east of Halema'uma'u crater. Usually, though not always, these changes propagate through the magma conduit from the summit to the eruption site, as many of the DI events at Kilauea summit are also recorded at a tiltmeter at Pu'u 'O'o, delayed by 1-2 hours. DI events often correlate with lava pulses and/or pauses in the eruption at the Pu'u 'O'o/July 21/TEB vents.

More definitions with photos can be found at <http://volcanoes.usgs.gov/images/pglossary/index.php>.

The Hawaiian Volcano Observatory is one of five volcano observatories within the U.S. Geological Survey and is responsible for monitoring volcanoes and earthquakes in Hawai'i.

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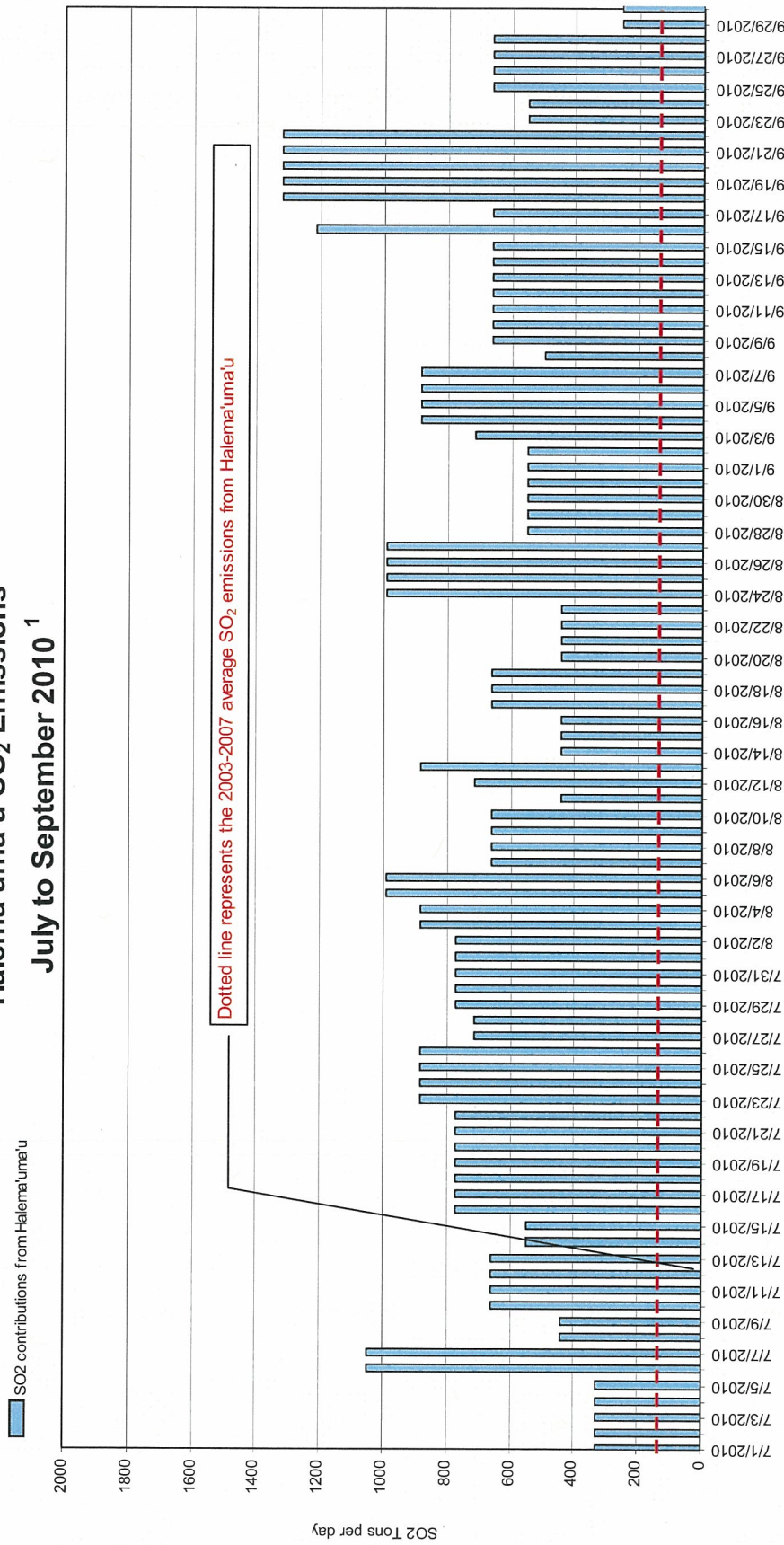
From

Day: Month: January Year: 2010

<http://volcanoes.usgs.gov/hvo/activity/archive.php>

ATTACHMENT 2

Halema'uma'u SO₂ Emissions July to September 2010 ¹

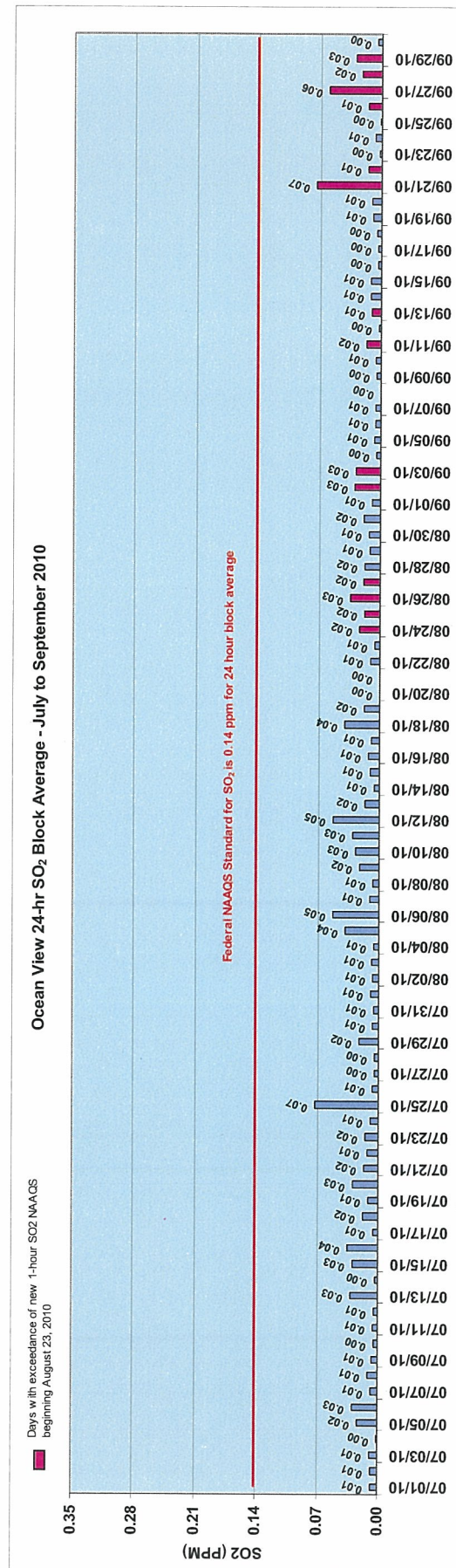
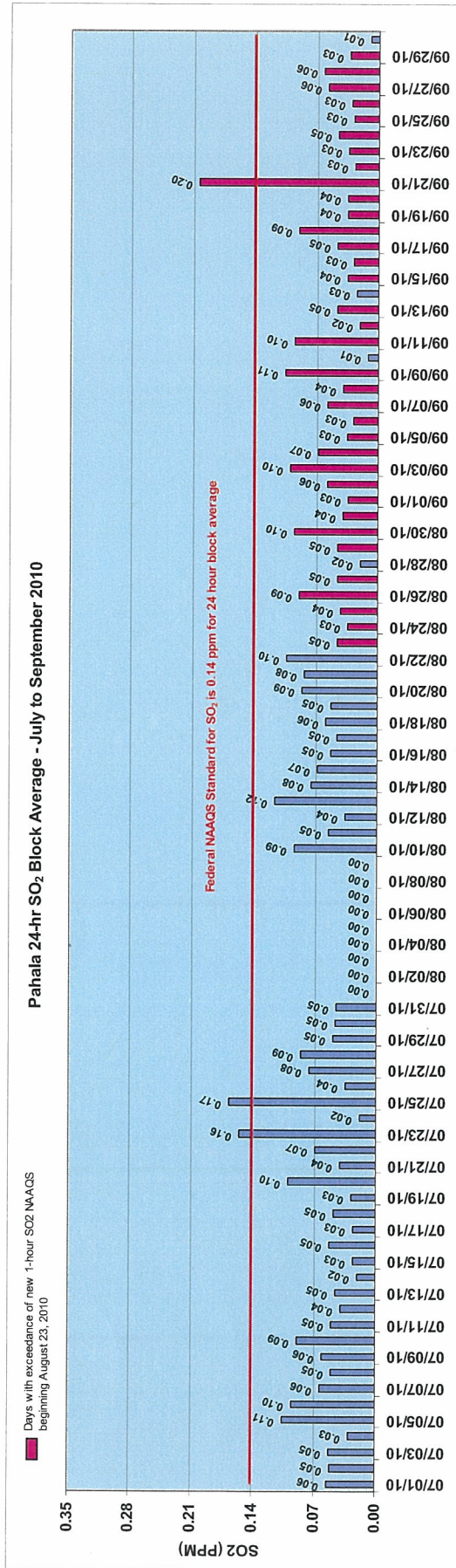


¹ SO₂ is not always measured daily and therefore the data in this chart may not reflect the actual daily emissions from the two vents
Note: New NAAQS 1-hour SO₂ standard effective August 23, 2010

For an explanation of the SO2 color scale, click [here](#). For a detailed explanation of the PM2.5 Aerosol color scheme, click [here](#).

For an explanation of the SO₂ color scale, click [here](#). For a detailed explanation of the PM_{2.5} Aerosol color scheme, click [here](#).

ATTACHMENT 4





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[\(Back to form\)](#)**HAWAIIAN VOLCANO OBSERVATORY DAILY UPDATE****Friday, July 23, 2010 7:50 AM HST (Friday, July 23, 2010 17:50 UTC)**

This report on the status of Kilauea volcanic activity, in addition to maps, photos, and Webcam images (available using the menu bar above), was prepared by the USGS Hawaiian Volcano Observatory (HVO). Hawai'i Volcanoes National Park status can be found at <http://www.nps.gov/havo/> or 985-6000. Hawai'i County Viewing Area status can be found at 961-8093. All times are Hawai'i Standard Time.

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**Current Aviation Color Code: **ORANGE**

Activity Summary for past 24 hours: Kilauea eruptive activity continued at two locations. The summit eruptive vent within Halema'uma'u Crater hosted a lava pond that produced red glow visible from the Jaggar Museum overnight. In the east rift zone, lava flowed from the TEB vent through tubes to supply active surface flows that have slowed their advance along highway 137 but are expanding to the south. Sulfur dioxide emission rates from the summit and east rift zone vents remained elevated.

Past 24 hours at Kilauea summit: The level of the crusted and circulating lava surface at the bottom of the deep collapse pit inset in the southeast edge of Halema'uma'u Crater was mostly stable except for two periods of high lava stand overnight. When weather permitted, glow within the vent gas plume was visible from the Jaggar Museum Overlook and in the HVO webcam overnight.

The summit tiltmeter network recorded continued DI inflation. Seismic tremor levels were at elevated and variable values typical of the last several weeks except for abrupt drops to near-zero values during lava high stands followed by strong tremor bursts lasting several minutes while the lava drained back to previous levels. The network of GPS receivers recorded contraction of the summit since June 16.

One earthquake was strong enough to be located beneath the summit area of Kilauea volcano.

The summit gas plume was moving to the southwest this morning. The most recent (preliminary) sulfur dioxide emission rate measurement was 800 tonnes/day on July 22, 2010, still above the 2003-2007 (pre-summit eruption) average of 140 tonnes/day.

Past 24 hours at the middle east rift zone vents and flow field: The tiltmeter on the north flank of Pu'u 'O'o recorded continued DI inflation. Seismic tremor levels remained at low values. GPS receivers on and around Pu'u 'O'o cone recorded contraction since June 16. There was no incandescence within Pu'u 'O'o crater last night.

The most recent (preliminary) sulfur dioxide emission rate measurement from east rift zone vents was 400 tonnes/day on July 16, 2010, much lower than the 2003-2007 (pre-summit eruption) average of 1,700 tonnes/day but typical of the low rates since early March, 2010.

Lava from the TEB vent flowed through tubes that carried lava down-slope to feed active surface flows in two locations on the coastal plain: a cluster of advancing lobes about 1 km (0.6 mi) behind and to the west of the lead lobe that has been creeping east over highway 137 and expanding to the south against the north-facing scarp of Hakuma horst. Surface activity continued through dawn as suggested by thermal anomalies recorded in GOES-WEST imagery this morning.

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ATTACHMENT 5

about 50 m in diameter at the pit floor, and is about 200 m (660 ft) deep. As of November, 2009, a lava pond surface has been visible in a hole in the floor of this pit.

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CD: Hawai'i County Civil Defense

RB2S2BL earthquakes: earthquakes that were recorded but were too small to be located. These quakes have magnitudes less than 1.7 and may only be recorded by one or two seismometers. Recording at a minimum of 4 seismometer sites is required to locate an earthquake.

tonne: metric unit equal to 1,000 kilograms, 2,204.6 lbs, or 1.1 English tons.

tephra: all material deposited by fallout from an eruption-related plume, regardless of size.

ash: tephra less than 2 mm (5/64 inches) in size.

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More definitions with photos can be found at <http://volcanoes.usgs.gov/images/pglossary/index.php>.

The Hawaiian Volcano Observatory is one of five volcano observatories within the U.S. Geological Survey and is responsible for monitoring volcanoes and earthquakes in Hawai'i.

HAWAIIAN VOLCANO OBSERVATORY CURRENT STATUS REPORT
Friday, July 23, 2010 3:16 PM HST (Saturday, July 24, 2010 01:16 UTC)

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**

Current Aviation Color Code: **ORANGE**

Kalapana Update

Lava from the TEB vent is flowing through tubes that carry lava down-slope to feed active surface flows in two locations on the coastal plain:

(1) Lava moving along Hwy 137 advanced about 80 m (260 ft) to the east since yesterday, but this eastward movement is south of the house that has been under threat the past few days. The house remains in jeopardy, though, because, as of 11:00 a.m. today, lava expanding north of Hwy 137 produced a small active flow that is creeping closer to the property.

The lava is also expanding south of Hwy 137 toward the ocean, and spreading laterally-eastward and westward-along a fault scarp (cliff) that parallels the coastline. This scarp, on the north side of Hakuma horst, has blocked lava from taking a direct path to the sea.

The potentially good news, however, is that the lava spreading to the west is approaching a low area in the fault scarp. This could provide a path for flows to reach the ocean, which could slow the eastward advance of lava toward Kalapana.

(2) Scattered lava flows also remain active about 1 km (0.6 mi) west and upslope of the Hwy 137 flow.

The Hawaiian Volcano Observatory is one of five volcano observatories within the U.S. Geological Survey and is responsible for monitoring volcanoes and earthquakes in Hawai'i.

**Volcano Hazards Program****Search Volcano Updates**[\(Back to form\)](#)**HAWAIIAN VOLCANO OBSERVATORY DAILY UPDATE****Sunday, July 25, 2010 6:38 AM HST (Sunday, July 25, 2010 16:38 UTC)**

This report on the status of Kilauea volcanic activity, in addition to maps, photos, and Webcam images (available using the menu bar above), was prepared by the USGS Hawaiian Volcano Observatory (HVO). Hawai'i Volcanoes National Park status can be found at <http://www.nps.gov/havo/> or 985-6000. Hawai'i County Viewing Area status can be found at 961-8093. All times are Hawai'i Standard Time.

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**Current Aviation Color Code: **ORANGE**

Activity Summary for past 24 hours: Kilauea eruptive activity continued at two locations. The summit eruptive vent within Halema'uma'u Crater hosted a lava pond that produced red glow visible from the Jaggar Museum overnight. In the east rift zone, lava flowed from the TEB vent through tubes to supply active surface flows that have made no significant progress along highway 137 in Kalapana but are expanding to the north and south. Sulfur dioxide emission rates from the summit and east rift zone vents remained elevated.

Past 24 hours at Kilauea summit: The summit tiltmeter network recorded the start of DI deflation at about 5:30 pm yesterday. Seismic tremor levels were at elevated and variable values typical of the last several weeks except for abrupt drops to near-zero values during lava high stands followed by strong tremor bursts lasting several minutes while the lava drained back to previous levels. The network of GPS receivers recorded contraction of the summit between June 16 and July 5 and no contraction or extension since.

The level of the crustal and circulating lava surface at the bottom of the deep collapse pit inset in the southeast edge of Halema'uma'u Crater was mostly stable except during a single high lava stand between 6 and 11 pm last night. When weather permitted, glow within the vent gas plume was visible from the Jaggar Museum Overlook and in the HVO webcam overnight.

Three earthquakes were strong enough to be located beneath Kilauea volcano - one beneath the uppermost east rift zone and two on south flank faults.

The summit gas plume was moving to the southwest this morning. The most recent (preliminary) sulfur dioxide emission rate measurement was 800 tonnes/day on July 22, 2010, still above the 2003-2007 (pre-summit eruption) average of 140 tonnes/day.

Past 24 hours at the middle east rift zone vents and flow field: The tiltmeter on the north flank of Pu'u 'O'o recorded the start of DI deflation at about 7:30 pm last night. Seismic tremor levels remained at low values. GPS receivers on and around Pu'u 'O'o cone recorded contraction between June 16 and July 5 and neither contraction or extension since. Since early Saturday morning, one spot of incandescence grew into several small spots on the floor of Pu'u 'O'o crater located at the north, near webcam, source of lavas during the most recent filling of the crater.

The most recent (preliminary) sulfur dioxide emission rate measurement from east rift zone vents was 400 tonnes/day on July 16, 2010, much lower than the 2003-2007 (pre-summit eruption) average of 1,700 tonnes/day but typical of the low rates since early March, 2010.

Lava from the TEB vent flowed through tubes that carried lava down-slope to feed active surface flows in two locations on the coastal plain: a cluster of advancing lobes about 1 km (0.6 mi) behind and to the west of the lead lobe creeping east over highway 137 in Kalapana; the lead lobe made no significant eastward progress by early yesterday afternoon but, instead, expanded to the north and south filling the area between the north-facing scarp of Hakuma horst and highway 137 (see status report from yesterday afternoon). Surface activity continued through dawn as suggested by thermal anomalies recorded in GOES-WEST imagery overnight. Another update on Kalapana activity will be posted by 4:30 pm H.s.t.

Maps, photos, Webcam views, and other information about Kilauea Volcano are available at <http://volcanoes.usgs.gov/hvo/activity/kilaueastatus.php>. A daily update summary is available by phone at (808) 967-8862.

A map with details of earthquakes located within the past two weeks can be found at <http://tux.wr.usgs.gov/>

A definition of alert levels can be found at <http://volcanoes.usgs.gov/activity/alertsystem/index.php>

Definitions of Terms Used:

ATTACHMENT 5

Hakuma horst: a horst is an section of earth that is raised between two nearly parallel faults so that its surface is higher than the surrounding ground. The Hakuma horst is located along the coast west of Kalapana; it was responsible for diverting lava through Kalapana village in 1990 and appears to be having a similar influence on lava flows in 2010.

Halema'uma'u Overlook vent: has been difficult to describe concisely. The vent is actually a pit, or crater, in the floor of the larger Halema'uma'u Crater in the floor of the larger Kilauea caldera or crater - a crater within a crater within a crater. It is easiest to describe as a pit inset within the floor of a crater within a caldera. The pit is about 140 m (460 ft) in diameter at the Halema'uma'u Crater floor, is about 50 m in diameter at the pit floor, and is about 200 m (660 ft) deep. As of November, 2009, a lava pond surface has been visible in a hole in the floor of this pit.

glow: light from an unseen source; indirect light.

incandescence: the production of visible light from a hot surface. The term also refers to the light emitted from a hot surface. The color of the light is related to surface temperature. Some surfaces can display dull red incandescence at temperatures as low as 430 degrees Centigrade (806 degrees Fahrenheit). By contrast, molten lava displays bright orange to orange-yellow light from surfaces that are hotter than 900 degrees C (1,650 degrees F).

CD: Hawai'i County Civil Defense

RB2S2BL earthquakes: earthquakes that were recorded but were too small to be located. These quakes have magnitudes less than 1.7 and may only be recorded by one or two seismometers. Recording at a minimum of 4 seismometer sites is required to locate an earthquake.

tonne: metric unit equal to 1,000 kilograms, 2,204.6 lbs, or 1.1 English tons.

tephra: all material deposited by fallout from an eruption-related plume, regardless of size.

ash: tephra less than 2 mm (5/64 inches) in size.

TEB: Thanksgiving Eve Breakout, the designation used for lava flows that started with a breakout on November 21, 2007.

microradian: a measure of angle equivalent to 0.000057 degrees.

DI tilt event: DI is an abbreviation for 'deflation-inflation' and describes a volcanic event of uncertain significance. DI events are recorded by tiltmeters at Kilauea summit as an abrupt deflation of up to a few microradians in magnitude lasting several hours to 2-3 days followed by an abrupt inflation of approximately equal magnitude. The tilt events are usually accompanied by an increase in summit tremor during the deflation phase. A careful analysis of these events suggests that they may be related to changes in magma supply to a storage reservoir at less than 1 km depth, just east of Halema'uma'u crater. Usually, though not always, these changes propagate through the magma conduit from the summit to the eruption site, as many of the DI events at Kilauea summit are also recorded at a tiltmeter at Pu'u 'O'o, delayed by 1-2 hours. DI events often correlate with lava pulses and/or pauses in the eruption at the Pu'u 'O'o/July 21/TEB vents.

More definitions with photos can be found at <http://volcanoes.usgs.gov/images/pglossary/index.php>.

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HAWAIIAN VOLCANO OBSERVATORY CURRENT STATUS REPORT
Sunday, July 25, 2010 3:58 PM HST (Monday, July 26, 2010 01:58 UTC)

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**

Current Aviation Color Code: **ORANGE**

Kalapana Update

Lava from the TEB vent is flowing through tubes that carry lava down-slope to feed active surface flows in two locations on the coastal plain:

(1) Lava continues to move northeast into the few remaining, topographically low kipuka at the west edge of the Kalapana Gardens subdivision. There was a max of about 75 m (250 ft) of advancement in the past 24 hours. The advancing flows set on fire the western-most house on highway 137 at about 3:30 am this morning, according to CD officials, leaving only the roof and water tank visible by sunrise.

The lava, which had filled the depression on the northern edge of Hakuma horst, advanced through a low spot over the horst about 600 m (2,000 ft) southwest of the leading flows. A narrow lobe crossed the horst and reached the ocean at 2:07 pm this afternoon according to residents.

**Volcano Hazards Program**

Search Volcano Updates

[\(Back to form\)](#)**HAWAIIAN VOLCANO OBSERVATORY DAILY UPDATE****Tuesday, September 21, 2010 7:32 AM HST (Tuesday, September 21, 2010 17:32 UTC)**

This report on the status of Kilauea volcanic activity, in addition to maps, photos, and Webcam images (available using the menu bar above), was prepared by the USGS Hawaiian Volcano Observatory (HVO). Hawai'i Volcanoes National Park status can be found at <http://www.nps.gov/havo/> or 985-6000. Hawai'i County Viewing Area status can be found at 961-8093. All times are Hawai'i Standard Time.

KILAUEA VOLCANO (CAVW #1302-01-)

19°25'16" N 155°17'13" W, Summit Elevation 4091 ft (1247 m)

Current Volcano Alert Level: **WATCH**Current Aviation Color Code: **ORANGE**

Activity Summary for past 24 hours: DI inflation was ongoing while Kilauea eruptive activity continued at two locations. In the east rift zone, lava flowed from the TEB vent through tubes to feed one ocean entry and no surface flows. The summit eruptive vent within Halema'uma'u Crater hosted an active lava pond that produced red glow visible from the Jaggar Museum overnight. Sulfur dioxide emission rates from the summit and east rift zone vents remained elevated.

Past 24 hours at Kilauea summit: The summit tiltmeter network recorded continued DI inflation. The network of GPS receivers recorded overall extension across the summit, focused in the south caldera, since early March, 2010, with an abrupt 1 cm extension in early September followed by neither extension or contraction. One earthquake was strong enough to be located beneath Kilauea volcano on south flank faults.

The crusted and circulating lava surface at the bottom of the deep collapse pit inset in the southeast edge of Halema'uma'u Crater has been stable at around 160 m (525 ft) below the Halema'uma'u Crater floor. Seismic tremor levels remained elevated and variable. The lava lit up the gas plume and, when weather permitted, the glow was visible from the Jaggar Museum Overlook overnight.

The summit gas plume was robust and moving to the southwest this morning. The most recent (preliminary) sulfur dioxide emission rate measurement was 1,200 tonnes/day on September 17, still elevated above the 2003-2007 (pre-summit eruption) average of 140 tonnes/day. Small amounts of ash-sized tephra continued to be wafted up with the gas plume and deposited on nearby surfaces.

Past 24 hours at the middle east rift zone vents: The tiltmeter on the north flank of Pu'u 'O'o recorded continued DI inflation. GPS receivers on and around Pu'u 'O'o cone recorded extension since the beginning of September. Seismic tremor levels remained low. No incandescence was observed within the crater.

The most recent (preliminary) sulfur dioxide emission rate measurement from east rift zone vents was 200 tonnes/day on September 16, 2010, much lower than the 2003-2007 (pre-summit eruption) average of 1,700 tonnes/day but typical of the low rates since early March, 2010.

Lava from the TEB vent flowed through tubes that carried lava down-slope entering the ocean through the Puhi-o-Kalaikini delta producing a gas plume. Weak-to-indiscernible thermal anomalies were recorded in the GOES-WEST imagery for this area suggesting little or no surface activity through down on the pali or coastal plain.

HAZARD ALERT: The lava deltas and adjacent areas both inland and out to sea are some of the most hazardous areas on the flow field. Frequent delta/bench collapses give little warning, can produce hot rock falls inland and in the adjacent coastal waters, and can produce large local waves. The steam plume produced by lava entering the ocean contains fine lava fragments and an assortment of acid droplets that can be harmful to your health. The rapidly changing conditions near the ocean entry have been responsible for many injuries and a few deaths.

Kalapana Public Access Information from Hawai'i County Civil Defense: Kalapana Gardens is a private subdivision and access will only be granted to subdivision residents. Private property borders highway 130 through Kalapana and no one is allowed access off the highway easement. Hawai'i County Police will be monitoring the area. Hawai'i County Viewing Area status can be found at 961-8093.

Maps, photos, Webcam views, and other information about Kilauea Volcano are available at <http://volcanoes.usgs.gov/hvo/activity/kilaueastatus.php>. A daily update summary is available by phone at (808) 967-8862.

A map with details of earthquakes located within the past two weeks can be found at <http://tux.wr.usgs.gov/>

A definition of alert levels can be found at <http://volcanoes.usgs.gov/activity/alertsystem/index.php>

Definitions of Terms Used:

high lava stands: Starting in June, 2010, lava within the Halema'uma'u Overlook vent rises 20-40 m over an interval of 10s of minutes, remains high for up to several hours, and then drains back to its previous level, while vigorously degassing, in several minutes. During the high stand, the gas plume becomes wispy, gas emissions halve in rate, and seismic tremor drops to very low levels; the high stand is followed by a strong seismic tremor burst, lasting several minutes, accompanying the draining. Many, but not all, high lava stands start with a rockfall event, some accompanied by VLP seismic energy.

Inflating surface flow: is a lava flow that may not advance but continues to thicken as its top and bottom crusts grow around a continuously replenished molten interior. This can be visualized as a large flat bladder of molten lava that could burst along its edges at any time.

Hakuma horst: a horst is an section of earth that is raised between two nearly parallel faults so that its surface is higher than the surrounding ground. The Hakuma horst is located along the coast west of Kalapana; it was responsible for diverting lava through Kalapana village in 1990 and appears to be having a similar influence on lava flows in 2010.

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tephra: all material deposited by fallout from an eruption-related plume, regardless of size.

ash: tephra less than 2 mm (5/64 inches) in size.

TEB: Thanksgiving Eve Breakout, the designation used for lava flows that started with a breakout on November 21, 2007.

microradian: a measure of angle equivalent to 0.000057 degrees.

DI tilt event: DI is an abbreviation for 'deflation-inflation' and describes a volcanic event of uncertain significance. DI events are recorded by tiltmeters at Kilauea summit as an abrupt deflation of up to a few microradians in magnitude lasting several hours to 2-3 days followed by an abrupt inflation of approximately equal magnitude. The tilt events are usually accompanied by an increase in summit tremor during the deflation phase. A careful analysis of these events suggests that they may be related to changes in magma supply to a storage reservoir at less than 1 km depth, just east of Halema'uma'u crater. Usually, though not always, these changes propagate through the magma conduit from the summit to the eruption site, as many of the DI events at Kilauea summit are also recorded at a tiltmeter at Pu'u 'O'o, delayed by 1-2 hours. DI events often correlate with lava pulses and/or pauses in the eruption at the Pu'u 'O'o/July 21/TEB vents.

More definitions with photos can be found at <http://volcanoes.usgs.gov/images/pglossary/index.php>.

The Hawaiian Volcano Observatory is one of five volcano observatories within the U.S. Geological Survey and is responsible for monitoring volcanoes and earthquakes in Hawai'i.

Enter a time period

From

Day: Month: January Year: 2010

To

Day: Month: January Year: 2010

ATTACHMENT 6

History for MKKUH1

KEAUMO HI US, **Volcano, HI** — Current Conditions

The data provider for this station: RAWS

Daily Summary for July 23, 2010

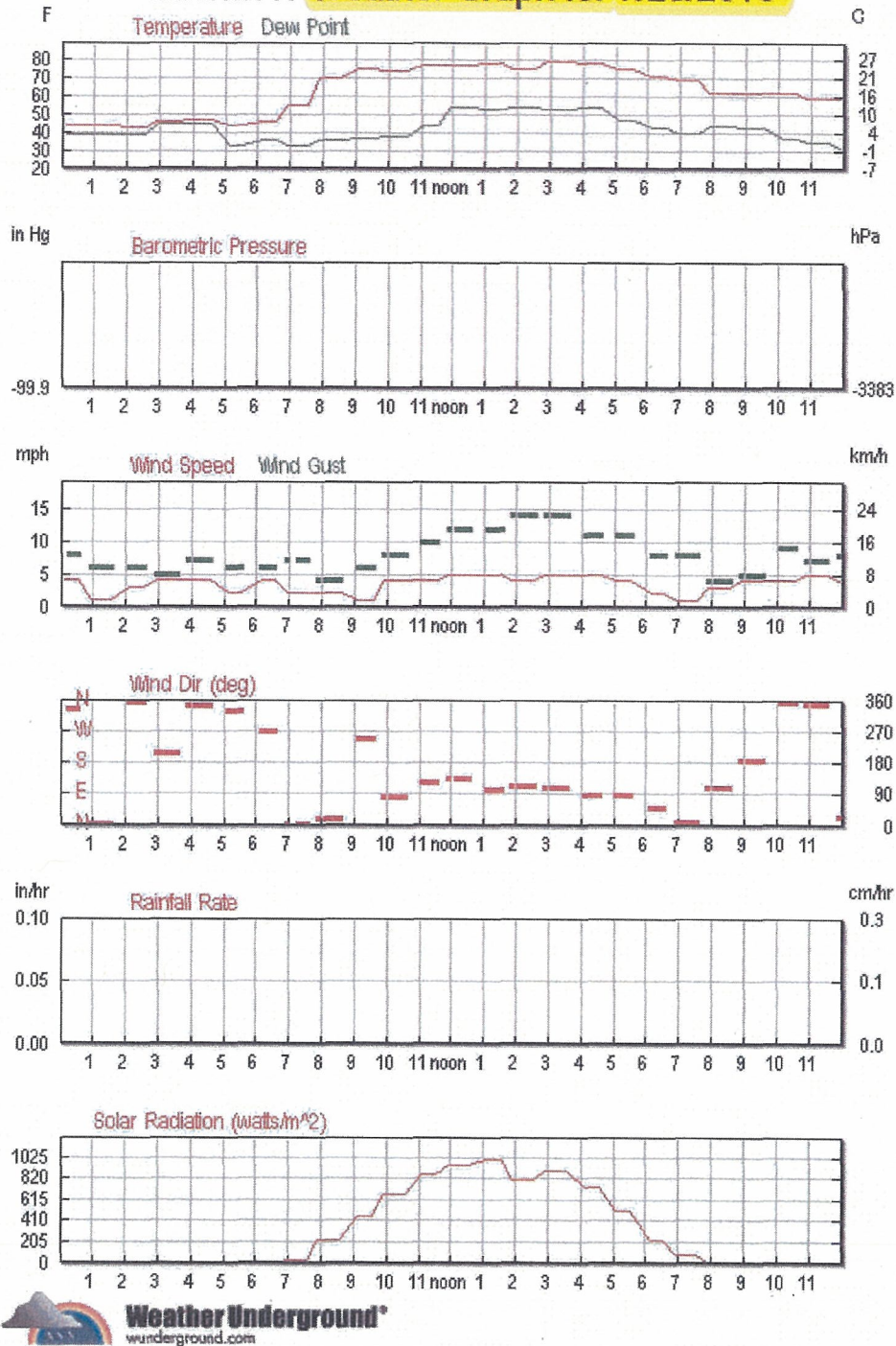
	Current:	High:	Low:	Average:
Temperature:	66.0 °F	79.0 °F	43.0 °F	63.0 °F
Dew Point:	54.0 °F	54.0 °F	32.0 °F	42.6 °F
Humidity:	65%	95%	25%	51%
Wind Speed:	5.0mph	5.0mph	-	3.4mph
Wind Gust:	13.0mph	14.0mph	-	-
Wind:	NNE	-	-	ENE
Pressure:	0.00in	0.00in	40.00in	-
Precipitation:	0.00in			
Solar Radiation:	361.000000 watts/m^2			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	83.0 °F	37.0 °F	60.3 °F
Dew Point:	60.0 °F	2.0 °F	43.8 °F
Humidity:	97.0%	8.0%	61.3%
Wind Speed:	15.0mph from the North	-	5.5mph
Wind Gust:	31.0mph from the SSW	-	-
Wind:	-	-	ENE
Pressure:	0.00in	40.00in	-
Precipitation:	0.20in		

ATTACHMENT 6

MKKUH1 Weather Graph for 7/23/2010



Tabular Data for July 23, 2010

Time	Temp.	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Solar Radiation
00:08	44.0 °F	39.0 °F	-100.00in	NNW	4.0mph	8.0mph	82%	0.00in	0.000000 watts/m^2
00:15	44.0 °F	39.0 °F	-100.00in	NNW	4.0mph	8.0mph	82%	0.00in	0.000000 watts/m^2
00:23	44.0 °F	39.0 °F	-100.00in	NNW	4.0mph	8.0mph	82%	0.00in	0.000000 watts/m^2

ATTACHMENT 6

History for MKKUH1

KEAUMO HI US, **Volcano, HI** — Current Conditions

The data provider for this station: RAW5

Daily Summary for **July 25, 2010**

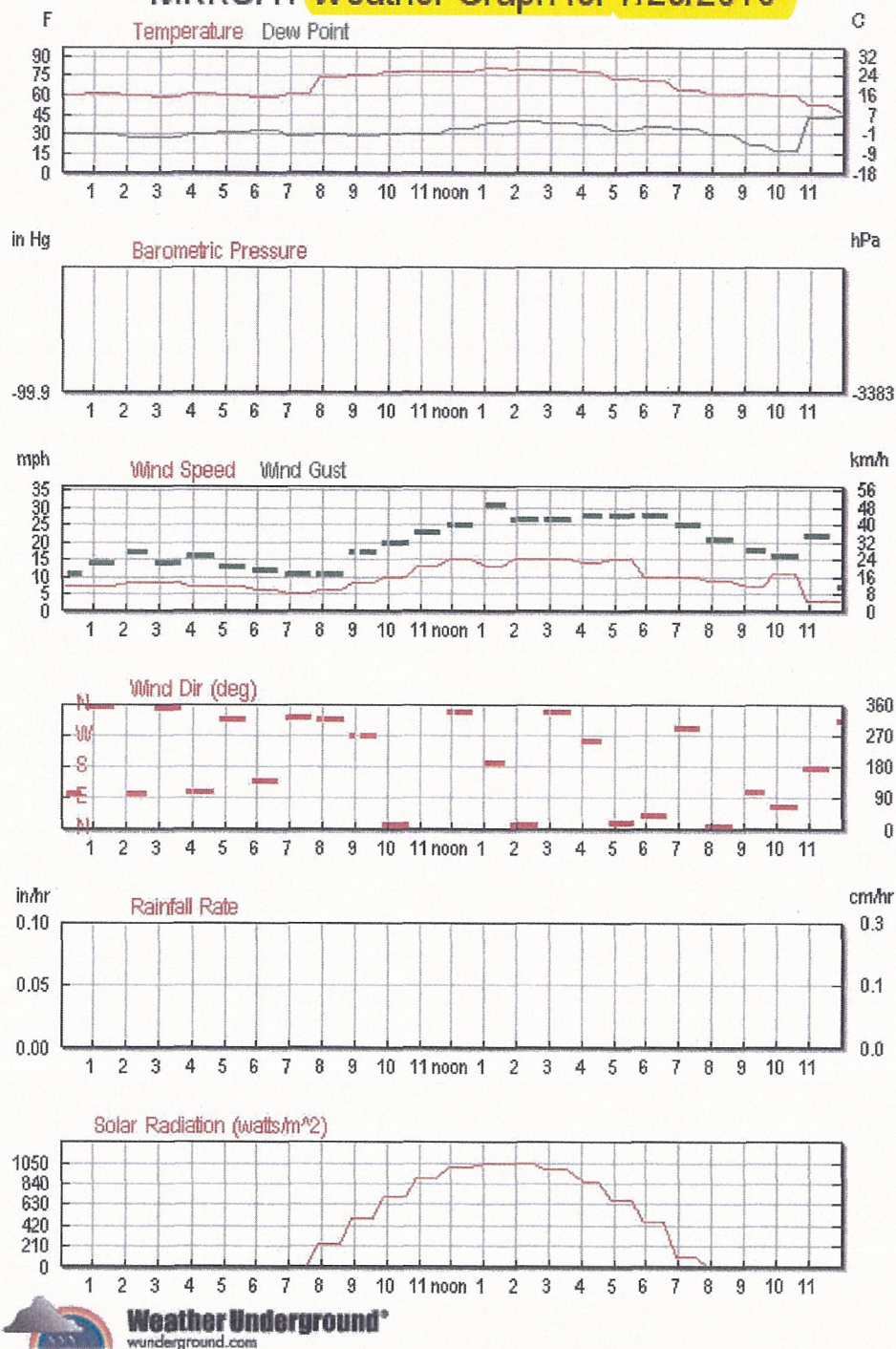
	Current:	High:	Low:	Average:
Temperature:	66.0 °F	81.0 °F	48.0 °F	67.8 °F
Dew Point:	54.0 °F	44.0 °F	18.0 °F	32.1 °F
Humidity:	65%	85%	17%	28%
Wind Speed:	5.0mph	15.0mph	-	9.5mph
Wind Gust:	13.0mph	31.0mph	-	-
Wind:	NNE	-	-	North
Pressure:	0.00in	0.00in	40.00in	-
Precipitation:	0.00in			
Solar Radiation:	361.000000 watts/m^2			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	83.0 °F	37.0 °F	60.3 °F
Dew Point:	60.0 °F	2.0 °F	43.8 °F
Humidity:	97.0%	8.0%	61.3%
Wind Speed:	15.0mph from the North	-	5.5mph
Wind Gust:	31.0mph from the SSW	-	-
Wind:	-	-	ENE
Pressure:	0.00in	40.00in	-
Precipitation:	0.20in		

ATTACHMENT 6

MKKUH1 Weather Graph for 7/25/2010



Tabular Data for July 25, 2010

Time	Temp.	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Solar Radiation
00:07	60.0 °F	30.0 °F	-100.00in	East	7.0mph	11.0mph	32%	0.00in	0.000000 watts/m^2
00:16	60.0 °F	30.0 °F	-100.00in	East	7.0mph	11.0mph	32%	0.00in	0.000000 watts/m^2
00:24	60.0 °F	30.0 °F	-100.00in	East	7.0mph	11.0mph	32%	0.00in	0.000000 watts/m^2

ATTACHMENT 6

History for MKKUHI

KEAUMO HI US, Volcano, HI — Current Conditions

The data provider for this station: RAW5

Daily Summary for September 21, 2010

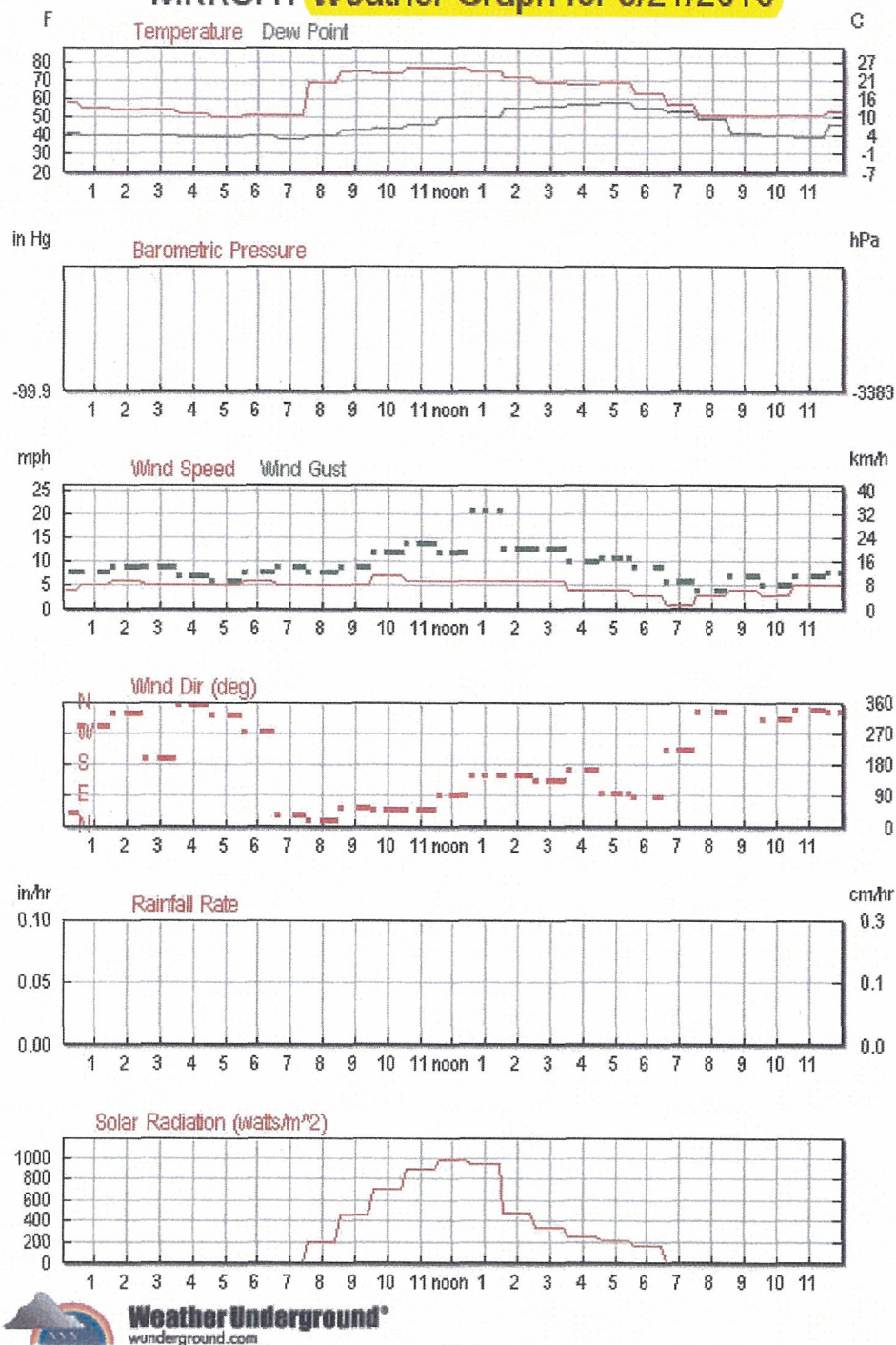
	Current:	High:	Low:	Average:
Temperature:	66.0 °F	77.0 °F	50.0 °F	61.5 °F
Dew Point:	54.0 °F	58.0 °F	38.0 °F	45.5 °F
Humidity:	65%	93%	32%	58%
Wind Speed:	5.0mph	7.0mph	-	4.9mph
Wind Gust:	13.0mph	21.0mph	-	-
Wind:	NNE	-	-	NNE
Pressure:	0.00in	0.00in	40.00in	-
Precipitation:	0.00in			
Solar Radiation:	361.000000 watts/m^2			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	83.0 °F	35.0 °F	60.5 °F
Dew Point:	58.0 °F	-99.9 °F	43.2 °F
Humidity:	97.0%	7.0%	58.2%
Wind Speed:	15.0mph from the NNE	-	4.6mph
Wind Gust:	32.0mph from the North	-	-
Wind:	-	-	NE
Pressure:	0.00in	40.00in	-
Precipitation:	0.04in		

ATTACHMENT 6

MKKUH1 Weather Graph for 9/21/2010



Tabular Data for September 21, 2010

Time	Temp.	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Solar Radiation
00:08	58.0 °F	41.0 °F	-100.00in	NE	4.0mph	8.0mph	53%	0.00in	0.000000 watts/m^2
00:15	58.0 °F	41.0 °F	-100.00in	NE	4.0mph	8.0mph	53%	0.00in	0.000000 watts/m^2
00:24	58.0 °F	41.0 °F	-100.00in	NE	4.0mph	8.0mph	53%	0.00in	0.000000 watts/m^2

ATTACHMENT 7

List of Exceedances of the National Ambient Air Quality Standards

The Hawai'i State Department of Health is required to notify the public whenever the National Ambient Air Quality Standards (NAAQS) are exceeded. The list below shows the most recent exceedances due to an exceptional or natural event. For a list of previous exceedances through 2009, please see the Department of Health, Clean Air Branch web page.

DATE	MONITORING STATION LOCATION & ISLAND	AIR POLLUTANT	STANDARD TYPE	STANDARD LIMIT	ACTUAL	CAUSE
Oct. 3, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.271 ppm (10-11 a.m.)	volcanic emissions
Oct. 3, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.390 ppm 10-11 p.m.)	volcanic emissions
Sep. 29, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.194 ppm (6-7 a.m.)	volcanic emissions
Sep. 29, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.184 ppm (5-6 a.m.)	volcanic emissions
Sep. 28, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.087 ppm (10-11a.m.)	volcanic emissions
Sep. 28, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.317 ppm (4-5 a.m.)	volcanic emissions
Sep. 27, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.309 ppm (3-4 a.m.)	volcanic emissions
Sep. 27, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.284 ppm (5-6 a.m.)	volcanic emissions
Sep. 26, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.197 ppm (8-9 a.m.)	volcanic emissions
Sep. 26, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.110 ppm (8-9 a.m.)	volcanic emissions
Sep. 25, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.159 ppm (10-11 p.m.)	volcanic emissions
Sep. 24, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.176 ppm (12-1 a.m.)	volcanic emissions
Sep. 23, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.158 ppm (1-2 a.m.)	volcanic emissions
Sep. 22, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.087 ppm (8-9 a.m.)	volcanic emissions
Sep. 22, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.081 ppm (5-6 a.m.)	volcanic emissions
Sep. 21, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.254 ppm (12-1 a.m.)	volcanic emissions
Sep. 21, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 1-hour avg.	0.14 ppm 0.075 ppm	0.20 ppm 0.582 ppm (7-8 a.m.)	volcanic emissions
Sep. 20, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.189 ppm (11-12 p.m.)	volcanic emissions
Sep. 19, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.101 ppm (12-1 a.m.)	volcanic emissions
Sep. 18, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.472 ppm (7-8 a.m.)	volcanic emissions
Sep. 17, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.217 ppm (11-12 p.m.)	volcanic emissions
Sep. 16, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.296 ppm (1-2 a.m.)	volcanic emissions
Sep. 15, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.353 ppm (7-8 a.m.)	volcanic emissions
Sep. 13, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.124 ppm (6-7 a.m.)	volcanic emissions

ATTACHMENT 7

Sep. 13, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.196 ppm (7-8 a.m.)	volcanic emissions
Sep. 12, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.099 ppm (11-12 p.m.)	volcanic emissions
Sep. 11, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.088 ppm (10-11 p.m.)	volcanic emissions
Sep. 11, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.436 ppm (4-5 a.m.)	volcanic emissions
Sep. 9, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.361 ppm (2-3 a.m.)	volcanic emissions
Sep. 8, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.126 ppm (3-4 a.m.)	volcanic emissions
Sep. 7, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.205 ppm (9-10 a.m.)	volcanic emissions
Sep. 6, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.101 ppm (1-2 a.m.)	volcanic emissions
Sep. 5, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.132 ppm (8-9 a.m.)	volcanic emissions
Sep. 4, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.225 ppm (2-3 a.m.)	volcanic emissions
Sep. 3, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.228 ppm (9-10 a.m.)	volcanic emissions
Sep. 3, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.380 ppm (6-7 a.m.)	volcanic emissions
Sep. 2, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.112 ppm (8-9 a.m.)	volcanic emissions
Sep. 2, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.199 ppm (12-1 a.m.)	volcanic emissions
Sep. 1, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.202 ppm (11-12 p.m.)	volcanic emissions
Aug. 31, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.146 ppm (9-10 a.m.)	volcanic emissions
Aug. 30, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.345 ppm (2-3 a.m.)	volcanic emissions
Aug. 29, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.132 ppm (8-9 a.m.)	volcanic emissions
Aug. 27, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.150 ppm (8-9 a.m.)	volcanic emissions
Aug. 27, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.246 ppm (1-2 a.m.)	volcanic emissions
Aug. 26, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.125 ppm (6-7 a.m.)	volcanic emissions
Aug. 26, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.343 ppm (5-6 a.m.)	volcanic emissions
Aug. 25, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.095 ppm (9-10 a.m.)	volcanic emissions
Aug. 25, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.177 ppm (9-10 a.m.)	volcanic emissions
Aug. 24, 2010	Ocean View, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.154 ppm (10-11 a.m.)	volcanic emissions
Aug. 24, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.117 ppm (11-12 p.m.)	volcanic emissions
Aug. 23, 2010	Pahala, Hawaii	SO ₂	1-hour avg.	0.075 ppm	0.300 ppm (4-5 a.m.)	volcanic emissions
July 25, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
July 23, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.16 ppm 0.6 ppm (3-6 a.m.)	volcanic emissions
June 22, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.21 ppm	volcanic emissions

ATTACHMENT 7

June 3, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.21 ppm 0.6 ppm (3-6 a.m.) 1.0 ppm (6-9 a.m.)	volcanic emissions
May 29, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
May 27, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.15 ppm 0.8 ppm (3-6 a.m.)	volcanic emissions
May 22, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
May 20, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
May 9, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
May 7, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
May 6, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.22 ppm 0.6 ppm (6-9 p.m.)	volcanic emissions
April 27, 2010	Ocean View, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
March 21, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.20 ppm 0.6 ppm (3-6 a.m.) 0.6 ppm (6-9 a.m.)	volcanic emissions
March 20, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
March 19, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.22 ppm	volcanic emissions
March 10, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
March 9, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.16 ppm	volcanic emissions
March 8, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
March 6, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
March 5, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.23 ppm 0.7 ppm (6-9 p.m.)	volcanic emissions
March 4, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.20 ppm	volcanic emissions
March 3, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
March 2, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
March 1, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
Feb. 28, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.18 ppm	volcanic emissions
Feb. 27, 2010	Pahala, Hawaii	SO ₂	3-hour avg.	0.5 ppm	0.7 ppm (6-9 a.m.)	volcanic emissions
Feb. 25, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	36 µg/m ³	volcanic emissions
Feb. 24, 2010	Hilo, Hawaii	SO ₂	3-hour avg.	0.5 ppm	0.7 ppm (6-9 a.m.)	volcanic emissions
Feb. 18, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.19 ppm	volcanic emissions
Feb. 11, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
Feb. 10, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.20 ppm	volcanic emissions

ATTACHMENT 7

Feb. 8, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.18 ppm 0.6 ppm (3-6 a.m.)	volcanic emissions
Feb. 6, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
Feb. 5, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.19 ppm	volcanic emissions
Jan. 31, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.20 ppm 0.8 ppm (6-9 a.m.)	volcanic emissions
Jan. 27, 2010	Mountain View, Hawaii	PM _{2.5} SO ₂ SO ₂	24-hour avg. 24-hour avg. 3-hour avg.	35 µg/m ³ 0.14 ppm 0.5 ppm	43 µg/m ³ 0.22 ppm 1.0 ppm (6-9 a.m.)	volcanic emissions
Jan. 24, 2010	Mountain View, Hawaii	PM _{2.5} SO ₂ SO ₂	24-hour avg. 24-hour avg. 3-hour avg.	35 µg/m ³ 0.14 ppm 0.5 ppm	38 µg/m ³ 0.22 ppm 0.8 ppm (midnight-3 a.m.)	volcanic emissions
Jan. 22, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.22 ppm 0.6 ppm (3-6 a.m.) 0.6 ppm (6-9 a.m.)	volcanic emissions
Jan. 20, 2010	Pahala, Hawaii	PM _{2.5} SO ₂ SO ₂ SO ₂ SO ₂	24-hour avg. 24-hour avg. 3-hour avg. 3-hour avg. 3-hour avg.	35 µg/m ³ 0.14 ppm 0.5 ppm 0.5 ppm 0.5 ppm	47 µg/m ³ 0.52 ppm 0.9 ppm (midnight-3 a.m.) 1.0 ppm (3-6 a.m.) 0.9 ppm (6-9 a.m.) 0.7 ppm (9 a.m.-12 noon)	volcanic emissions
Jan. 19, 2010	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
Jan. 18, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.24 ppm 0.7 ppm (6-9 a.m.)	volcanic emissions
Jan. 17, 2010	Mountain View, Hawaii	PM _{2.5} SO ₂ SO ₂	24-hour avg. 24-hour avg. 3-hour avg.	35 µg/m ³ 0.14 ppm 0.5 ppm	38 µg/m ³ 0.16 ppm 0.7 ppm (6-9 a.m.)	volcanic emissions
Jan. 17, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.23 ppm 0.7 ppm (midnight-3 a.m.)	volcanic emissions
Jan. 16, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	37 µg/m ³	volcanic emissions and wild brushfires
Jan. 15, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.40 ppm 0.7 ppm (3-6 a.m.) 0.8 ppm (6-9 a.m.) 0.9 ppm (9 a.m.-12 noon)	volcanic emissions
Jan. 14, 2010	Pahala, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	36 µg/m ³	volcanic emissions
Jan. 10, 2010	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.26 ppm 1.0 ppm (3-6 a.m.) 0.7 ppm (6-9 a.m.)	volcanic emissions
Jan. 9, 2010	Hilo, Hawaii	SO ₂	24-hour avg. 3-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm 0.5 ppm	0.21 ppm 0.7 ppm (3-6 a.m.) 0.7 ppm (6-9 a.m.)	volcanic emissions

ATTACHMENT 7

Jan. 9, 2010	Mountain View, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.21 ppm 0.8 ppm (3-6 a.m.)	volcanic emissions
Jan. 9, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	38 µg/m ³	volcanic emissions and wild brushfires
Jan. 8, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	63 µg/m ³	volcanic emissions and wild brushfires
Jan. 7, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	39 µg/m ³	volcanic emissions and wild brushfires
Jan. 4, 2010	Mountain View, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	36 µg/m ³	volcanic emissions
Jan. 2, 2010	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	37 µg/m ³	volcanic emissions and wild brushfires
Jan. 1, 2010	Honolulu, Oahu	PM _{2.5}	24-hour avg.	35 µg/m ³	62 µg/m ³	New Year's fireworks
Jan. 1, 2010	Pearl City, Oahu	PM _{2.5}	24-hour avg.	35 µg/m ³	45 µg/m ³	New Year's fireworks
Jan. 1, 2010	Sand Island, Oahu	PM _{2.5}	24-hour avg.	35 µg/m ³	36 µg/m ³	New Year's fireworks
Dec. 31, 2009	Mountain View, Hawaii	PM _{2.5} SO ₂	24-hour avg. 24-hour avg.	35 µg/m ³ 0.14 ppm	58 µg/m ³ 0.21 ppm	volcanic emissions
Dec. 27, 2009	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	48 µg/m ³	wild brushfires
Dec. 25, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.19 ppm	volcanic emissions
Dec. 24, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
Dec. 23, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.16 ppm	volcanic emissions
Dec. 19, 2009	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	47 µg/m ³	wild brushfires
Dec. 18, 2009	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	63 µg/m ³	wild brushfires
Dec. 15, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
Dec. 11, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.17 ppm	volcanic emissions
Dec. 10, 2009	Pahala, Hawaii	SO ₂	24-hour avg.	0.14 ppm	0.15 ppm	volcanic emissions
Dec. 10, 2009	Kona, Hawaii	PM _{2.5}	24-hour avg.	35 µg/m ³	36 µg/m ³	volcanic emissions
Dec. 9, 2009	Pahala, Hawaii	SO ₂	24-hour avg. 3-hour avg.	0.14 ppm 0.5 ppm	0.18 ppm 0.6 ppm (3-6 a.m.)	volcanic emissions

ppm = unit of the standard is in parts per million

µg/m³ = unit of the standard is in micrograms per cubic meter of air

Attachment 8

- 1) Honolulu Star-Advertiser Public notice: Affidavit of Publication
(State-wide distribution)
- 2) Hawaii Tribune-Herald Public notice: Affidavit of Publication
(East Hawaii newspaper distribution)
- 3) West Hawaii Today Public notice: Affidavit of Publication
(West Hawaii newspaper distribution)